

TECHNOLOGY NEEDS/OPPORTUNITIES STATEMENT

DECONTAMINATION OF K BASIN POOL

Identification No.: RL-SNF02

Date: November 2000

Program: Spent Nuclear Fuel (SNF)

OPS Office/Site: Richland Operations Office/Hanford Site

PBS No.: RL-RS03

Waste Stream: ERW-02 MLLW Debris to ERDF (Beta and Gamma contamination that is embedded in concrete).

TSD Title: N/A

Operable Unit (if applicable): 100-KR-2

Waste Management Unit (if applicable): N/A

Facility: KE Basin

Priority Rating:

This entry addresses the "Accelerated Cleanup: Paths to Closure (ACPC)" Priority:

- ☒ 1. Critical to the success of the ACPC
- ☐ 2. Provides substantial benefit to ACPC projects (e.g., moderate to high lifecycle cost savings or risk reduction, increased likelihood of compliance, increased assurance to avoid schedule delays)
- ☐ 3. Provides opportunities for significant, but lower cost savings or risk reduction, and may reduce uncertainty in ACPC project success.

Need Title: Decontamination of K Basin Pool.

Need/Opportunity Category: *Technology Need* -- There is no existing or currently identified technology capable of solving the site's problem (i.e., technology gap exists, no baseline approach has been identified).

Need Description: A method to remove radioactive contaminants that have migrated into the surface of the concrete of the KE Basin fuel storage pool. The contamination exists as a "bathtub ring" and as deposits of varying thicknesses throughout the sides and bottom of the concrete pool. The primary contaminants are cesium and strontium. The upper level of the basin wall has been treated with epoxy and the water level has been raised to provide shielding during fuel and sludge removal. The basin cannot be emptied of water until the contamination is either removed or additional shielding is provided. The water also acts as a contaminant containment barrier. No high-efficiency particulate air (HEPA) filtration system exists at either basin.

Schedule Requirements:

Earliest Date Required: (09/2002)

Latest Date Required: (09/2003)

The removal of fuel from the K Basins is scheduled for completion in 2004. Decontamination of the pool will proceed shortly thereafter. Completion of the K Basin Deactivation program is currently scheduled for July 2007.

Problem Description: Contamination represents an immediate worker exposure concern as well as a long-term environmental concern. The KE Basin pool is contaminated with cesium, strontium, uranium, and transuranic components. The presence of these contaminants prevents drainage of the basin as the water serves as a radiation shield and containment barrier. There is a concentration of contaminants in a “bathtub ring” located near the surface of the water.

In addition to the “bathtub ring,” radioactive contamination has penetrated to varying depths into the concrete wall and floor surfaces. Current decontamination practices include physical removal of the concrete surface (i.e., scabbling, sand blasting, etc.). None of these have been demonstrated underwater. Some contaminated concrete surfaces have also been painted and/or coated with a fixative. Project requirements may include removal of such coatings prior to decontamination of the concrete.

Potential Life-Cycle Cost Savings of Need (in \$000s) and Cost Savings Explanation: Mortgage rates can be reduced through the implementation of cost-effective methods for decontamination and the transition of the facility into a stable condition that requires low surveillance and maintenance. New technology has the potential of reducing the cost by approximately 20% of the cost of the baseline technology. Baseline technology ROM is \$17 M, therefore, ROM cost savings is \$3.4 M.

Benefit to the Project Baseline of Filling Need: Identification of an appropriate method for decontaminating the KE Basin pool will allow completion of basin deactivation activities, thereby supporting the Hanford Site cleanup progress.

Relevant PBS Milestone: S00-01-909 - Complete Spent Nuclear Fuel Project

Functional Performance Requirements: A decontamination method is needed that minimizes worker exposure, secondary waste generation, cost, and risk. It also should be readily deployable. Concrete decontamination technologies shall be capable of being remotely operated and mobile supplemental shielding must be provided to minimize worker exposure during setup.

Underwater stripping technologies must minimize turbidity (maintaining water clarity is a major concern). If underwater stripping technology is not employed, some form of airborne contaminant containment is necessary. The decontamination technology must be capable of operation on both vertical and horizontal surfaces. These surfaces are not uniform with sections that vary in width from 1 inch to 125 feet. Removal of a fixative

may also be required in some areas. The ability to collect and characterize contaminants as they are removed is also required.

Work Breakdown **TIP No.:**
Structure (WBS) No.:

1.3.1 S10-99-950

Justification For Need:

Technical: Decommissioning of the K Basin pool to a stable condition requires the removal of the pool water. This cannot occur until the level of residual contamination can be reduced or shielded to a safe level because the water in the pool currently serves as a radiation shield. Any remaining residual contaminants must be fixed in place after water removal because the basin does not have a HEPA filtration system.

Regulatory: *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) milestone M-34-00A requires complete removal of spent nuclear fuel, sludge, debris, and water by July 31, 2007. Radiation levels must be reduced prior to removal of shielding water.

Environmental Safety & Health: Radioactive contamination presents safety/exposure concerns.

Cultural/Stakeholder Concerns: Decontamination of materials and equipment that are present in facilities near the Columbia River reduces the risk of offsite contamination.

Other: None identified.

Current Baseline Technology: N/A.

End-User: SNF Project, Larry McDaniel (509) 373-0199

Contractor Facility/Project Manager: SNF Process Engineering, Jim McClusky, Fluor Hanford (FH), (509) 373-2281, Fax (509) 373-1542, James_K_McClusky@rl.gov

Site Technical Points-of-Contact: Bruce Makenas, Fluor Hanford (FH), (509) 376-5447, Fax (509) 376-8027, Bruce_J_Makenas@rl.gov; Jim Sloughter, Numatec Hanford Corporation (NHC), (509) 373-0591, Fax (509) 372-1542, James_P_Sloughter@rl.gov

DOE End-User/Representative Point-of-Contact: Steve J. Veitenheimer, DOE-RL, (509) 373-9725, fax (509) 373-9837, Steve_J_Veitenheimer@rl.gov